WHAT IS CLAIMED IS:

1. A method for removing thromboembolic material from a carotid or cerebral artery, comprising the steps of:

providing a catheter having a proximal end, a distal end, an expandable distal section having a distal port, an aspiration lumen communicating with the port, and an axially moveable support;

inserting the distal end of the catheter into the artery;

distally axially advancing the support to expand the distal section; and

applying a negative pressure to the aspiration port, to draw the thromboembolic material into the distal section.

2. The method of claim 1, wherein the carotid artery is the common carotid artery.

3. The method of claim 1, wherein the carotid artery is selected from the group consisting of the internal carotid artery and carotid siphon.

4. The method of claim 1, wherein the artery is the middle cerebral artery.

5. The method of claim 1, wherein the artery is the anterior cerebral artery.

6. The method of claim 1, further comprising the step of introducing oxygenated medium into the artery through the aspiration lumen.

7. The method of claim 6, wherein the oxygenated medium is hypothermic.

8. The method of claim 1, further comprising the step of infusing pharmaceutical agent into the carotid artery through the aspiration lumen.

9. The method of claim 8, wherein the pharmaceutical agent is a vasodilator.

10. The method of claim 9, wherein the vasodilator is selected from the group consisting of nifedipine and nitroprusside.

11. The method of claim 8, wherein the pharmaceutical agent is t-PA.

12. The method of claim 1, further comprising the step of localizing the thromboembolic material with intravascular ultrasound.

13. The method of claim 1, further comprising the step of localizing the thromboembolic material with carotid doppler.

14. An intracranial aspiration catheter, comprising:

an elongate, flexible tubular body, having a proximal end, a distal end, and an

aspiration lumen extending therethrough;

a distal section on the body in which the aspiration lumen is movable between a first, reduced inside diameter for transluminal navigation and a second, enlarged inside diameter for aspirating material;

a support for controllably supporting the aspiration lumen against collapse when in the second diameter; and

a control on the proximal end of the catheter for controlling the support.

15. An intracranial aspiration catheter as in Claim 14, wherein the support comprises a spiral element.

16. An intracranial aspiration catheter as in Claim 15, wherein the support comprises a spring coil.

17. An intracranial aspiration catheter as in Claim 14, wherein the support is axially movable.

18. An intracranial aspiration catheter as in Claim 14, wherein the support is activated by rotating a first end of the support relative to a second end of the support.

19. An intracranial aspiration catheter as in Claim 14, wherein the aspiration lumen is defined within a tubular wall having a plurality of folds therein when the aspiration lumen is in the first inside diameter configuration.

20. An intracranial aspiration catheter as in Claim 14, wherein the aspiration lumen is defined within a stretchable tubular wall.

21. A method of establishing a flow path through a catheter, positioned across a nonlinear segment of vasculature, comprising the steps of:

transluminally navigating an enlargeable tubular wall through a nonlinear segment of vasculature;

manipulating a support within the tubular wall to enlarge the inside diameter of the tubular wall to create a flow path across the nonlinear segment.

22. A method of establishing a flow path as in Claim 21, wherein the manipulating step comprises distally advancing a tubular support structure within the tubular wall.

23. A method of establishing a flow path as in Claim 22, comprising distally advancing a coil within the tubular wall.

24. A method of aspirating material, comprising the steps of:

transluminally advancing a catheter to the site of an obstruction, the catheter having an aspiration lumen therein;

moving a support within the aspiration lumen; and thereafter

aspirating material from the obstruction through the aspiration lumen.

25. A method of aspirating material as in Claim 24, wherein the moving a support comprises distally advancing a tubular support.

26. A method of aspirating material as in Claim 25, wherein the moving a support comprises distally advancing a coil.

27. A method of aspirating material as in Claim 24, wherein the obstruction is in the common carotid artery.

28. A method of aspirating material as in Claim 24, wherein the obstruction is in the internal carotid artery.

29. A method of aspirating material as in Claim 24, wherein the obstruction is in the carotid siphon.

30. A method of aspirating material as in Claim 24, wherein the obstruction is in the middle cerebral artery.

31. A method of aspirating material as in Claim 24, wherein the obstruction is in the anterior cerebral artery.

32. An intracranial aspiration catheter, comprising:

an elongate, flexible tubular body, having a proximal end, a distal end, and an aspiration lumen extending therethrough;

a distal section on the body in which the aspiration lumen is movable between a first, reduced inside diameter for transluminal navigation and a second, enlarged inside diameter for aspirating material;

a support which is axially movable between a proximal position when the aspiration lumen is in the first diameter and a distal position for supporting the aspiration lumen against collapse when in the second diameter.

33. An intracranial aspiration catheter as in Claim 32, wherein the support comprises a coil.

34. An intracranial aspiration catheter as in Claim 32, wherein the distal section has a length of no greater than about 20 cm.

35. An intracranial aspiration catheter as in Claim 32, wherein the distal section has a length of no greater than about 10 cm.

36. An intracranial aspiration catheter as in Claim 32, wherein the distal section has a length within the range of from about 5 cm and about 15 cm.